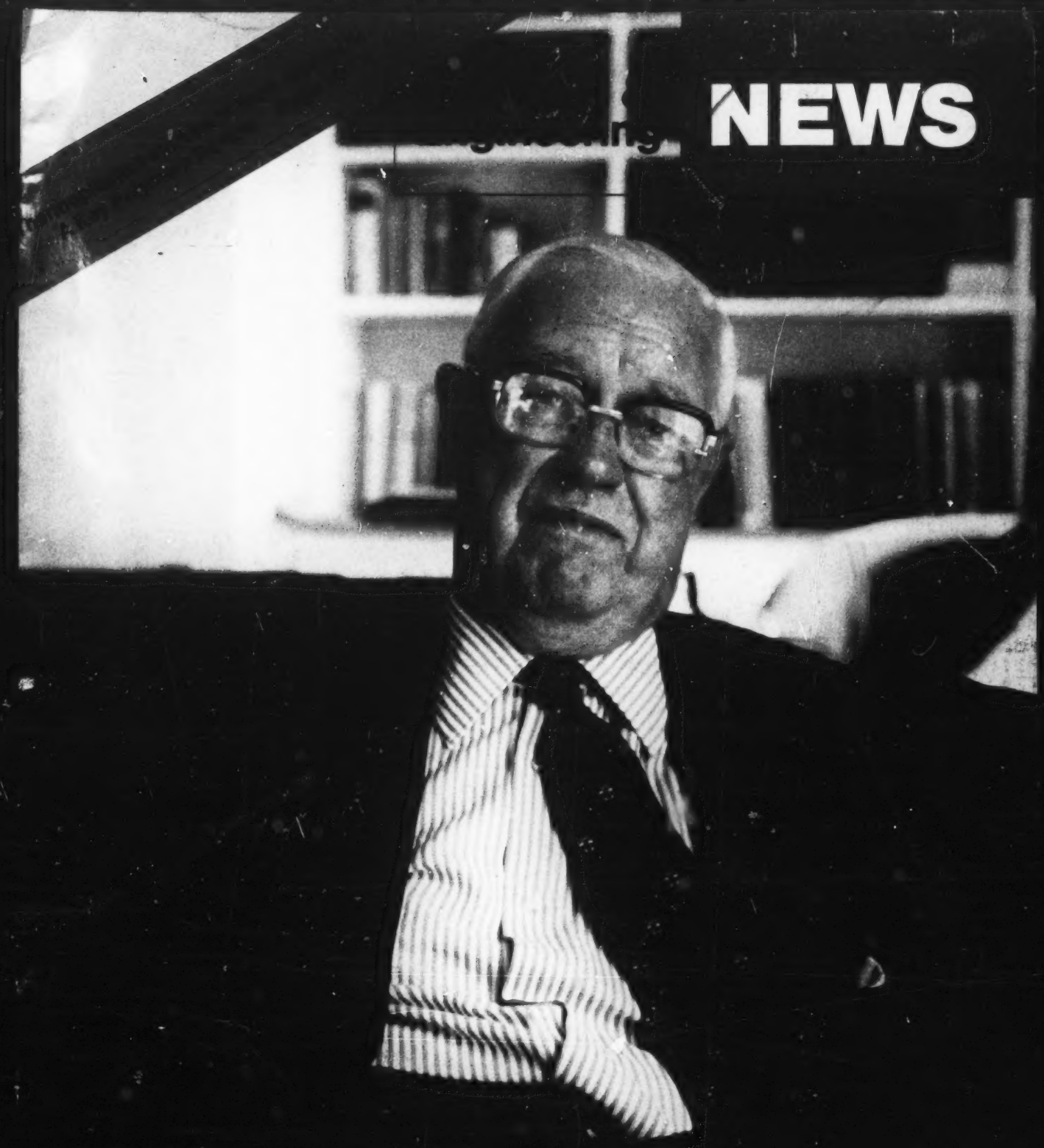

NEWS

The state of chemistry

An extended interview with Lord Todd of the Royal Society Page 08

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WASTE SITES POSE RISK TO WATER SUPPLY

A House subcommittee has released a list of more than 2100 industrial waste sites where hazardous chemicals may be leaching into groundwater supplies, and singles out 250 sites where hazard to usable public drinking water supplies may be imminent. A report containing the list was prepared by the Subcommittee on Environment, Energy & Natural Resources using data collected over the past two years by the Environmental Protection Agency.

Subcommittee chairman Toby Moffett (D.-Conn.) says the investigation has led the subcommittee to call for formation of a national groundwater policy as soon as possible. "Based on the [limited] criteria used and the data asked for, it is striking just how many hazardous sites there are," Moffett says.

The report stresses that it is not accusing the owners or operators of the specific sites of polluting groundwater. The significance of the list, it states, is in the considerable number of these sites and how many of them may have impoundments that pose a contamination risk to water supplies.

The EPA data show the locations and owners of more than 170,000 so-called surface waste impoundments. These include agricultural runoffs, septic tank cleaning, pits, ponds, lagoons, and other waste-holding areas. It does not include places such as farm ponds, storage tanks, irrigation ditches, or domestic sewage treatment systems.

EPA survey shows most waste areas are not industrial sites

Category	Located sites	Assessed sites	Located impoundments
Industrial	10,819	6,163	25,749
Municipal	19,102	10,792	36,161
Agricultural	14,373	8,562	18,765
Mining			
Noncoal	1,688	618	4,028
Coal	5,388	837	20,350
Oil and gas brine pits	24,527	3,314	64,951
Other	1,781	680	6,645
TOTAL	77,678	30,964	176,647

Source: EPA report "Surface Impoundment Assessment" June 1980

Of the total, fewer than 26,000 are listed as industrial waste storage impoundments. As much as 70% of these are thought to be unlined; that is, there is no barrier to prevent leaching of wastes into groundwater. About 30% of the total, or 7800 impoundments, are listed as having no barriers and are "directly on top of" groundwater sources. In a final breakdown, there are 250 sites believed to contain hazardous chemical wastes and that are unlined and are within 1 mile of a public water supply well.

These hazardous sites are located in 35 states, according to the following distribution: Florida 54; South Carolina 23; Ohio 21; Pennsylvania 20; Connecticut 18; Mississippi 14; Missouri 13; Michigan 11; Tennessee 10; Arizona nine; Indiana eight; New York and New Jersey, six each; California and Massachusetts, four each; Louisiana three; Colorado, Kansas, Iowa, Maryland, North Carolina, Wisconsin, and West Virginia, two each; and Minnesota, New Mexico, Vermont, Washington, Delaware, Illinois, Kentucky, Montana, Oregon, Texas, Virginia, and Wyoming, one each.

Moffett is careful to emphasize the uncertainty and preliminary nature of this information. "Because these data are from the states, we cannot vouch for their accuracy," Moffett says. "Some of the sites may be safe, but all appear to be candidates for serious problems." The report states that most of the data was not collected from owners or operators of the sites and that information sources were often second-hand. Many of the sites apparently were not examined by state officials directly. In all, the report says the data provide "a first round approximation of the magnitude of the problem."

Because of the uncertainty of the data, the subcommittee is preparing a questionnaire to be sent to the owners or operators of the sites listed in the EPA study. It is expected to be sent out soon, and the subcommittee likely will have some results by this winter.

The report is only the first of a series of investigations by Moffett's subcommittee into groundwater pollution and is part of Congress' growing concern about the problem. Moffett already has held hearings on the issue and says he may call for more hearings in November. In addition, joint hearings on the same issue were held in August by the House subcommittees on Transportation & Commerce and on Health & the Environment.

C&EN staff photo

Moffett: possible serious problems

Several recommendations are presented to EPA in the report. It asks the agency to continue to cooperate with the states in formulating as quickly as possible a definitive national groundwater policy.

The report urges EPA to use its existing statutory authorities to their limit to protect groundwater sources. These authorities come primarily from the Resource Conservation & Recovery Act, which currently is being revised.

In addition, the subcommittee gives EPA a mandate to report to Congress within 120 days on the progress it has made, if any, toward these goals. The agency also is asked to detail whatever additional resources and authorizations are needed to protect the nation's groundwater supplies. □

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Thermoplastics begin uncertain recovery

Both production and sales have moved up from low point for polyethylene, polyvinyl chloride, polypropylene, and polystyrene

Bruce F. Greek, C&EN Houston, and William F. Fallwell, C&EN New York

Has the recession safely ended for the major U.S. thermoplastics? As the third quarter drew to a close, industry opinion generally was yes, the production low point has passed for low- and high-density polyethylene, polyvinyl chloride, polypropylene, and polystyrene. Sales of these polymers, detailed on the following pages, also are up steadily from the troughs of early summer.

Now the big question is whether the resurgence will last. Many marketing executives concerned with the thermoplastics are uncertain. Signs are increasing that a recovery from the recession could stall. Most important, rapid interest rate increases of late could dampen auto sales and housing construction again and throttle back the whole plastics business in the first half of 1981. Real recovery might wait until late in the year.

Thermoplastics managers have to keep an eye on such general performance in the economy because of the very size of the thermoplastics part of the chemical industry. Although still growing considerably faster than constant-dollar gross national product, thermoplastics in their relative maturity are a vital part of most consumer products. Thus, as the consumer and the general economy go, so in a magnified way go thermoplastics.

This has been an unfortunate correlation this year. In 1980, performance of the five largest volume thermoplastics will be substantially lower than in 1979 and also lower than GNP. Estimates now indicate that production of these five thermoplastics will total just over 23 billion lb, down 13% from 1979.

Because of the slump in production, value of these polymers in 1980 will just about equal the value of the greater quantity produced in 1979 at just over $9 billion.

Hence, thermoplastics prices still went up in 1980—a combined average of 15% over 1979 to 39 cents per lb. This means that producers passed on some of their cost increases to buyers.

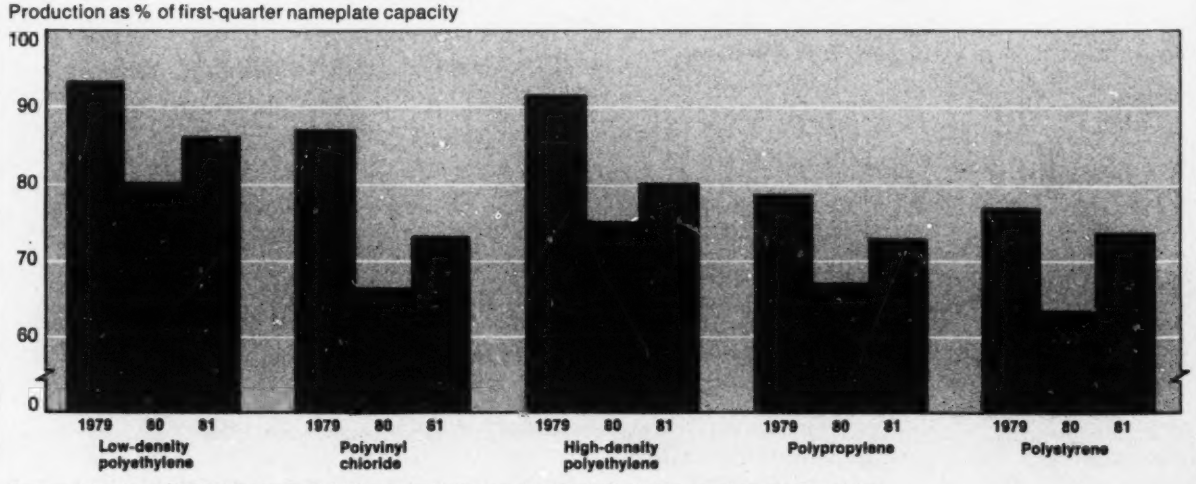
What is not clear is how much of the cost increases producers have had to absorb themselves. Probably a lot, contributing to a big drop in profitability.

The end result from lower sales volume and higher costs is much lower profitability for thermoplastics. Some, especially PVC and polypropylene, staggered under long periods of unprofitable operation during 1980, possibly long enough to wipe out profits for the whole year.

The question now is whether the pickup in thermoplastics sales currently under way will be enough to turn around the profit picture in 1981. Certainly volume will be up unless a severe recessionary tail hits in 1981 because of a renewed credit squeeze. Production of the five major thermoplastics will just about return to the level of 1979 production, reaching 26.5 billion lb if the recovery continues at a moderate pace. Some polymers will do better than others in 1981, with production of high-density polyethylene and polypropylene possibly exceeding that of 1979, although not by much.

Higher production will help spread capital and operating costs thinner and help profitability. However, selling price needs to increase proportionately greater than monomer costs to increase profitability. Most

Even with a marked recovery, plant use in 1981 won't match use in 1979



Sources: Industry and C&EN estimates; Ernst & Whinney for the Society of the Plastics Industry's committee on resin statistics

industry opinion holds that price increases won't be much more than hydrocarbon cost increases, 10 to 20%, unless the current war between Iran and Iraq takes more than 4 million bbl a day from the noncommunist world oil supply. That big a drop in oil supply could dry up the current oil surplus and give chemical companies higher hydrocarbon costs to worry about.

This kind of a thermoplastics price increase would leave nothing basically for improved profit. But it would spark greater efforts to improve plant efficiency. Some technical efficiency gains can result from new plants coming on stream, but high capital costs tend to offset these efficiencies. In older plants, companies are deep in retrofit projects to pick up production economics, especially through energy savings.

Another way to improve resin profitability is to develop specialty grades selling at a premium. Producers are hard at work to lessen their dependence on general-purpose grades.

But overall, 1981 doesn't look like another 1979 for thermoplastics volume or profits. For one thing, 5% more plant capacity has come or will be coming on stream in 1980. With the new capacity, a return to 1979 production levels still would mean average plant operating rates below those of 1979. By present estimates, the combined operating rate for the five thermoplastics will be about 78% in 1981, up from 71% for 1980, but well below the highly profitable 86% in 1979.

Producers are looking to domestic U.S. markets to take most of the 1981 production increase. Exports are up just 9% in 1980 after a 34% jump in 1979. They will do well to equal 1980 in 1981. Their share of total thermoplastics output will drop to 11% in 1981 from 13% this year. In 1979, exports took 10% of production.

The expected exports plateau comes from increasing hydrocarbon costs in the U.S. and a growing recession in Europe, which will influence European thermoplastics producers to sell their products abroad for less. If the Iran-Iraq war causes an increase in oil prices, however, U.S. producers would keep their cost advantage a bit longer.

The export and other major factors affecting business in the five major thermoplastics are unnerving reminders of the previous recession of 1974–75: the slump in production and sales as capacity increases, a profitability collapse as prices tumble, and the use of exports to move production as foreign plants face relatively higher costs than plants in the U.S. To many in the industry, the similarities are almost uncanny.

Overall, early data from the Society of the Plastics Industry's committee on resin statistics, as compiled by Ernst & Whinney, suggest that the severity and duration of the decline in these thermoplastics' production have been less so far this time than last—32% from January through July 1980 compared to 40% from September 1974 through March 1975. The sales decline this time, 27%, also is less than the 37% drop last time.

Sales and production declines have hit all the major thermoplastics but have had varying effects on profits. Relative list price changes from a year ago tell much of the story. Obviously, the worst damage is in PVC, whose current price at 31 cents is below 35 cents a year ago. Polypropylene has eked out a mere 1-cent net gain to 36 cents over the past year and has suffered a severe profitability drop. Polystyrene also is barely up in price, 2 cents to 43 cents. The two polyethylenes have fared best, with a 6-cent gain in low-density to 41 cents and a 9-cent increase in high-density to 45 cents, the highest current price among the five major resins. Of course, discounting has reduced much of these apparent price gains.

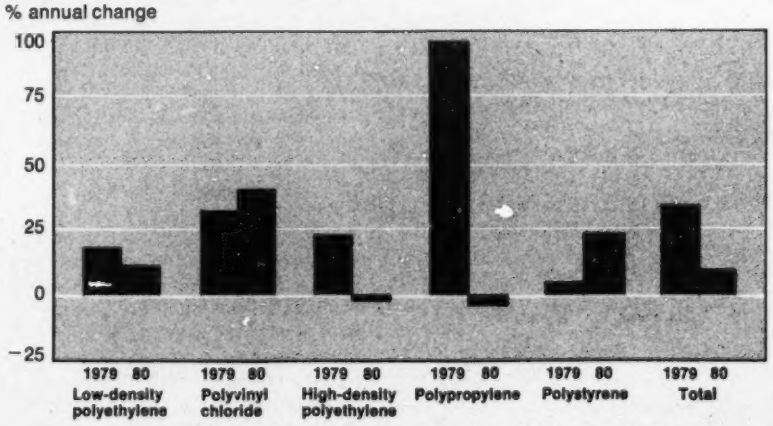
In handing thermoplastics producers this profit pasting, the recession has seemed to make decisions unnecessary for at least a year, if not two years, on allocating investment money. However, by the end of 1981, indications will be clear, but maybe too late for competitive advantage, on whether plants should be built to be fully in operation two to four years later. Hence, now is the time to make studies and plant commitments, although the latter are in short supply to date. □

Production cut in recession is deep, more than sales drop

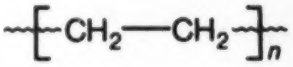
Although U.S. thermoplastics producers say that they were caught initially with excess production when the economy plunged in late April 1980, they quickly adjusted. Inventories may have ballooned temporarily, but producers worked hard to get them down by slashing production more than the overall sales drop. Monthly figures from the Society of the Plastics Industry's committee on resin statistics as compiled by Ernst & Whinney show an overall 32% production drop for the five leading thermoplastics from January through July 1980, the span currently considered to be the duration of the recession. The sales falloff during this period was 24%. By comparison, in the previous recession, which affected plastics from September 1974 through March 1975, combined production slumped an even worse 40%. However, this rate wasn't much more than the sales drop at the time, which fell a horrendous 37%.

% drop during recession		LDPE	PVC	HDPE	PP	PS	Total
Jan. 1980–July 80	Production	−29%	−38%	−26%	−33%	−35%	−32%
	Sales	−28	−24	−24	−19	−21	−24
Sept. 1974–March 75	Production	−40	−43	−28	−40	−45	−40
	Sales	−35	−39	−28	−41	−40	−37

Robust thermoplastics export growth in 1979 has subsided overall in 1980



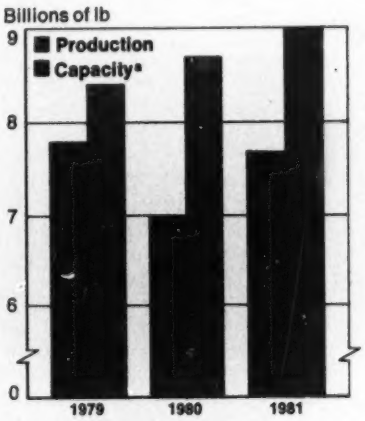
Sources: Industry and C&EN estimates; Ernst & Whinney for the Society of the Plastics Industry's committee on resin statistics



Low-density polyethylene

- ***Demand reviving***
- ***Capacity rising***
- ***Prices firming a bit***

PRODUCTION/CAPACITY



[a] Nameplate, first quarter.

HOW MADE

Polymerization of ethylene at high and low pressures aided by initiators

MAJOR FABRICATED FORMS

Film, largely for packaging, 65%; injection molding 10%; coatings 10%; extrusions 5%

FOREIGN TRADE

Exports—rising to nearly 1 billion lb in 1980, imports—negligible

PRICES

Contracts 41 cents per lb for most common grades, discounting prevalent

COMMERCIAL VALUE

$2.8 billion for total production, 1980

Low-density polyethylene's production decline this year may not equal production declines of other thermoplastics in either pounds or percentage points. But this small plus does little to relieve producers of this polymer, largest of the thermoplastics. Even a "wait until next year" attitude holds little solace at the moment, although the situation has begun to improve.

Production of low-density polyethylene in 1980 may do well to reach 7 billion lb, off about 10% from 1979. Optimists in the industry put 1980 production at 7.2 billion lb.

The optimists' reasoning comes from a closer look at available production statistics and current sales reports. During the first half of 1980, production of low-density polyethylene reached 3.7 billion lb, according to figures compiled by Ernst & Whinney for the committee on resin statistics of the Society of the Plastics Industry. Although it is true that year-to-year production dropped greatly as the first half closed—more than 30% in June alone, for example—and that sales fell even faster, the cumulative drop for the first half was tiny.

Then in July, production increased over June. Sales also increased, by a larger amount, indicating that inventories are being drawn down. Although statistics are not yet available for more recent months, production has risen. More important, sales are rising even more. Because of this improving tone in the marketplace, some industry analysts expect more than 7 billion lb production in 1980.

Some of the current profitability slump in low-density polyethylene might have been avoided if producers had sensed a changing market faster this spring. They might have slowed production sooner and less drastically than they actually did once inventories bulged. For example, in May sales were 133 million lb, about 22% of production of 615 million lb.

In June, when the production slashes peaked, output ran at an annualized rate of 5.5 billion lb. This put the operating rate for the industry at 63% of nameplate plant capacity, not a highly profitable level. Capacity was 8.7 billion lb per year in first-quarter 1980.

Things will not be this bad for the whole year. The average operating rate for 1980 probably will exceed 80%, quite good compared to other thermoplastics. Next year, with some capacity increases and an expected return to production volume of 7.7 billion to 7.8 billion lb, the operating rate could average 85% of first-quarter nameplate capacity of 9.0 billion lb.

For the future, operating rates increasingly will be affected by expansion of capacity to make the new linear low-density polyethylene. As yet capacity for this material is a small part of the total. However, such capacity may grow rapidly as polyethylene producers decide that this kind of material has both the physical properties desirable in various markets, particularly film, and attractive production economics because of the lower process pressures required compared to conventional low-density polyethylene. As polymer development comes along, long-term capacity expansion could be practically all in the new linear type.

Again as with other thermoplastics, the recession will not have much of an impact on the end-use pattern for low-density polyethylene. Film will continue to dominate with upwards of two thirds of the total but probably not above 70%.

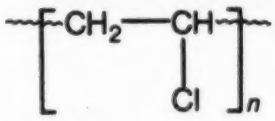
Exports have risen 11% this year to become the second largest outlet at about 1 billion lb. Later, exports probably will decline for the same reason affecting other plastics—reduced competitiveness of U.S. producers as they face higher raw material hydrocarbon costs.

Low-density polyethylene's export support has helped stave off an even worse financial performance. Its export volume (in pounds) is more than 40% greater than that of the next highest thermoplastic, polypropylene. And only polypropylene's exports are a greater percentage of total production, 20%, to low-density's 14%. High-density polyethylene also has enjoyed a 14% export level this year, but its export growth has stopped.

If improvements continue from the June low point in demand for low-density polyethylene, 1980 will turn out not too bad for a recession year. It could have been better, but low-density polyethylene has been spared the worst problems of other thermoplastics.

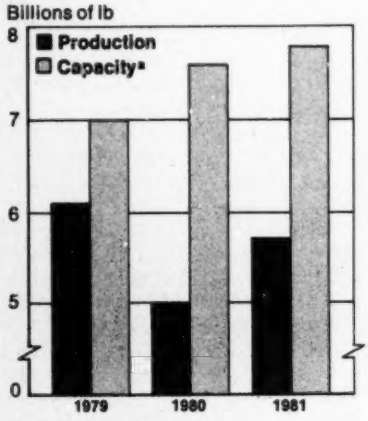
Key Polymers

Polyvinyl chloride



- ***Demand awakening***
- ***Capacity rise slowing***
- ***Prices down***

PRODUCTION/CAPACITY



a Nameplate, first quarter.

HOW MADE

Polymerization of vinyl chloride by suspension, emulsion, or mass processes using initiator such as peroxide.

MAJOR FABRICATED FORMS

Extrusions, largely pipe, 60%; calendered sheet and film 10%; coatings 10%; molding 10%

FOREIGN TRADE

Exports—rising sharply to 450 million lb in 1980, imports—negligible

PRICES

Contract price for general-purpose resin 31 cents a lb, discounting continues

COMMERCIAL VALUE

$1.75 billion for total production, 1980

Of the major thermoplastics, polyvinyl chloride seems likely to post the worse percentage production decline in 1980. The impact of this decline also is clearer for polyvinyl chloride than for other thermoplastics. No other polymer is as rife with reports of major producers' selling or trying to sell their facilities. In all, it has been a stunning reversal from a year ago.

Unless recovery from the recession goes much faster in the fourth quarter than now anticipated, production of polyvinyl chloride in 1980 will drop to about 5 billion lb, off 18% from 1979. This drop comes when capacity is nearly 10% higher than a year earlier at 7.6 billion lb in first-quarter 1980.

Polyvinyl chloride's woes show up clearly in its wobbly price structure. The resin's notoriously tough customers in its major market, construction pipe, have helped force down the basic list price to 31 cents a lb from 35 cents a year ago. No other major thermoplastic has had an actual net decline in list price over the past year.

Excluding a small amount of new capacity which has started up or will start up in 1980, production of 5 billion lb will give an average plant operating rate of about 65% for the year. This rate contrasts strongly with 1979, when plants ran over 85% of nameplate capacity. This year's rate also contrasts strongly with rates before 1978, which were so high, often above a comfortable rate, that new investment was almost lavish.

These capacity expansions have hurt in 1980 and will continue to hurt in 1981. Production of polyvinyl chloride next year probably will fall short of 1979 production at least 5%, possibly as much as 8%, by pessimistic forecasts. This year, additions to capacity will be about 200 million lb unless some capacity is shut down permanently. If 1981 production of polyvinyl chloride rebounds about 15% to about 5.7 billion lb—a big improvement in view of widespread opinion that U.S. economic recovery will be slow—and capacity reaches 7.8 billion lb, the operating rate will rise to 73%.

Two years of plant use rates well below traditional levels plus the possibility of a third have caused company managements to take a second look at their investment in polyvinyl chloride. Some, including Air Products and Diamond Shamrock, have decided to unload the plastic if possible.

Firestone Tire & Rubber's sale of its polyvinyl chloride business to Occidental Petroleum for about $200 million (C&EN, Sept. 22, page 7) is the first major exit. Occidental got about 700 million lb of annual capacity for this money, paying under 30 cents per lb of annual capacity—perhaps not a great bargain, but a good value.

Occidental has about 200 million lb of other polyvinyl chloride capacity but is not a producer of monomer, vinyl chloride. Its subsidiary, Hooker Chemical, produces chlorine, which could give the company some leverage in buying the monomer.

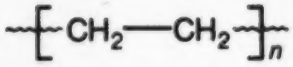
At this time, partly because of the slump in demand for polyvinyl chloride, chlorine and caustic soda have divergent production trends. Coproduct caustic soda prices are rising because of a supply crimp from a lack of chlorine demand. Chlorine producers, several of which are vinyl chloride producers, are pushing use of both chlorine and vinyl chloride in the polymer.

All this has led to added downward pressure on selling prices for polyvinyl chloride in addition to pressure from recessionary demand. As with other major thermoplastics, profitability in polyvinyl chloride probably is marginal. Renewed price increases as a result of higher hydrocarbon costs are as likely as in other thermoplastics but may not be so large in the next few months, since vinyl chloride is more than half chlorine by weight. Chlorine prices have been held down.

To some in the polyvinyl chloride business, the future seems one of overcapacity with demand growth holding in the 5 to 8% annual range over the next five years. In other words, regaining 1979's 6.1 billion lb annual production rate will take well into 1982.

Maturing end uses such as the very large market in pipe will hold PVC growth rates down. Outside factors such as rising interest rates' impact on housing could pull down even a conservative growth rate, making polyvinyl chloride a product to shun for new investment.

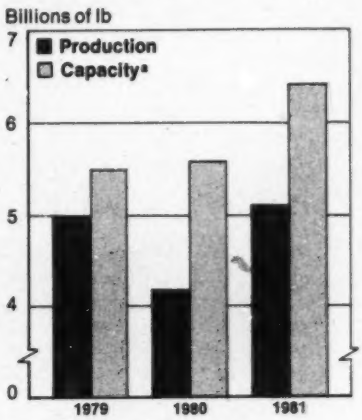
Key Polymers



High-density polyethylene

- ***Demand turning up***
- ***Capacity rising***
- ***Price slide past***

PRODUCTION/CAPACITY



[a] Nameplate, first quarter.

HOW MADE

Polymerization of ethylene under moderate pressure catalyzed by metal salts and alkyls

MAJOR FABRICATED FORMS

Blow molding, mainly containers, 45%; injection molding 20%; extrusions 10%; film 5%

FOREIGN TRADE

Exports—holding at about 600 million lb in 1980, imports—negligible

PRICES

Contracts about 45 cents per lb for common grades, discounting continues

COMMERCIAL VALUE

$1.75 billion for total production, 1980

High-density polyethylene joins other thermoplastics in a bad year in 1980. Production is off. Capacity will be or has been expanded when not really needed. Profitability will be marginal.

These conditions for 1980 represent a greater change for high-density polyethylene producers than for producers of most other plastics. For example, in 1979, producers generally struggled to meet demand for high-density polyethylene. Operations ran at more than 90% of the nameplate plant capacity of 5.5 billion lb at the beginning of the year. A few grades of the material were put on semiallocation.

Sales fell off drastically toward the end of the second quarter of 1980. Production also was cut back and has been held down during the summer as sales struggled along 20 to 25% below year-earlier levels.

But as with low-density polyethylene, sales and production of high-density material are beginning to recover. Some producers think that recovery will be better than expected, so the consensus forecast of 4.2 billion lb of production for 1980 may prove too low. If production doesn't do better than 4.2 billion lb, the decline will be one of the largest for thermoplastics at 16% from 1979.

Not much capacity came on stream for high-density polyethylene in 1979. Even so, with the production falloff this year, the plant operating rate could sink to 75% of nameplate capacity of 5.6 billion lb as of the first quarter.

Unfortunately, in 1979 and earlier, high-density polyethylene developed a reputation for supply tightness. This impression led to a round of plant expansions and shifts of capacity to high-density from low-density polyethylene production. The result has been 800 million lb per year of high-density capacity added, although not necessarily needed, in 1980. Therefore in 1981, even with full recovery of production to the 1979 level of 5.0 billion lb, plants will be operated at less than 50% of nameplate capacity.

A return of high-density polyethylene to 90% or higher levels of plant operation now seems unlikely for some time as a result of the recession and plans for further capacity expansion. After the recession is over, demand growth in high-density polyethylene could get back to 10% a year for some years, say optimists. But their mood is tempered by an even faster rate of capacity expansion, which will keep operating rates lower than in the recent economic expansion.

The end-use pattern for high-density polyethylene is not expected to change much. Some areas will not expand or will expand only slowly. For example, exports, forecast flat this year at about 600 million lb, probably will decline from now on, as U.S. production loses some of its marked raw material cost advantage of the past few years.

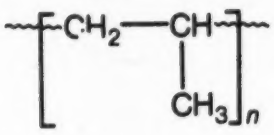
Few in the industry doubt that blow molding will continue to be the largest use of high-density polyethylene for some years ahead. The consumer container market has grown enormously to a level considered mature in some instances. However, high-density polyethylene is gaining new uses in blow-molded containers by replacing glass and metals as well as other plastics.

Other smaller uses could have large growth rates. For example, high-density polyethylene film is moving into many specialized packaging uses because of appearance and strength properties. The main drawback in film use, from resin producers' point of view, comes from the relatively large unit volume of finished product obtained per pound of resin in contrast to blow-molded items.

The pipe market, a part of the extrusions category, also could grow substantially. Competition comes in some pipe areas from low-density polyethylene. However, for the more severe industrial applications, pipe made from high-density polyethylene gets the nod over low-density.

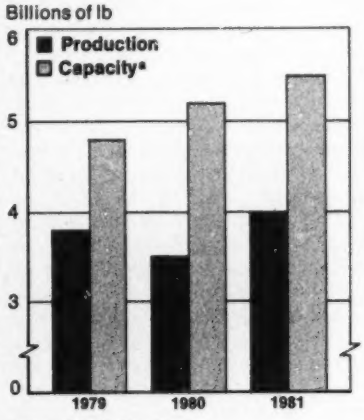
Many uses of high-density polyethylene get competition from polypropylene, especially if cost differences are more important than are processing or property differences. This competition has been around some time and may have affected polyethylene's growth, but it never has done that much to slow high-density product development. If anything, such competition could be a stimulus to product development. This in turn could allow high-density polyethylene to recover from its 1980 decline better than will some other thermoplastics.

Polypropylene



- ***Demand nosing up***
- ***Capacity up slightly***
- ***Prices weak***

PRODUCTION/CAPACITY



a Nameplate, first quarter.

HOW MADE

Polymerization of propylene catalyzed by metal salts and alkyls

MAJOR FABRICATED FORMS

Injection molding, much for transportation use, 40%; fibers 30%; film 10%

FOREIGN TRADE

Exports—may rise slightly to 700 million lb in 1980, imports—negligible

PRICES

Contract price for standard resins 36 cents per lb, spot prices lower

COMMERCIAL VALUE

$1.25 billion for total production, 1980

Polypropylene, like other thermoplastics, will not have a good year in 1980. Its difficulties strictly in terms of production could be less than for other thermoplastics. However, profitability will be marginal at best, since the business is not really in good shape.

Production of polypropylene in 1980 could be off less than for other plastics, perhaps down 8% from 1979 to about 3.5 billion lb. In so doing, polypropylene output has overtaken that of polystyrene this year.

So far, cumulative polypropylene production has been off less than 8%, but sales have slumped more. More severe recent slashes in production suggest that inventories are being cut to at least the level of monthly sales, if not lower.

Polypropylene's deeper problems also are hinted in the resin's basic list price, which at 36 cents a lb is up just a penny over a year ago. This price has been battered with heavy discounting this year, much of it due to polypropylene's bulging unused plant capacity.

Next year will be very "iffy" for polypropylene. U.S. demand in various end uses from automobiles to furniture to packaging all hinges on the outcome of the current recession. Even exports will be affected by recessionary economics in competing export nations as well as in foreign importing nations.

One widespread scenario for 1981 polypropylene production looks like the reverse of 1980. In 1980, production of polypropylene did well during most of the first half, then slumped during the summer. For the rest of 1980, production may continue well below 1979 but probably not so low as in July 1980.

In the first half of 1981, production may continue below most of the first half of 1980, especially if the apparent recovery from the recession slows down. Later in 1981, if the economy improves and consumer demand pressure builds, polypropylene production will increase to above the early 1980 levels.

In this view, second-half 1981 production will be the key to the whole year for polypropylene. Unless the second half is good, 1981 production will be lucky to match 1979 production.

Obviously, neither plant capacity nor raw material supply will have much influence on polypropylene production. New capacity additions now are slowing drastically as the last round of old expansions gets on stream.

The slowdown in capacity expansion unfortunately is only part of the needed remedy. With production down this year, capacity use will decline to just over two thirds of nameplate capacity of 5.2 billion lb available as the year began. The several relatively small capacity additions in 1980 will pull capacity use down to a lowly 65% for an annual average.

Not much improvement will occur in 1981 for capacity use. At best, polypropylene capacity will increase only a little more than the production increase expected for the year. If the optimistic view on production turns out high, then capacity use will remain well below 70%.

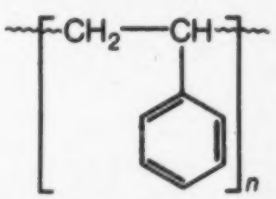
The recession is not expected to have much effect on the use pattern of polypropylene, just as past recessions have had little lasting effect. Of the various use categories, exports may be the one to decline next year. Cost competitiveness of U.S. polypropylene producers may fall in world markets because of increased costs of hydrocarbons in the U.S. relative to costs in other producing areas.

Increasing hydrocarbon costs—which mean that raw material polymer-grade propylene prices are not being forced down so much as are polypropylene selling prices—put polypropylene profitability on the skids. Currently, many industry sources doubt that polypropylene producers generally are making a profit when all costs are considered. So far, no capacity actually has been shut down, since all producers are part of strong companies that can stand the profit squeeze for a while.

The profit squeeze is undoubtedly causing much re-evaluation of new investment in polypropylene. Certainly, long-term capacity expansion forecasts have been put on hold. For if demand growth in polypropylene falls in the 5 to 8% range now widely expected, four to five years will be needed to reach full use of capacity, including capacity due to come on stream in 1981.

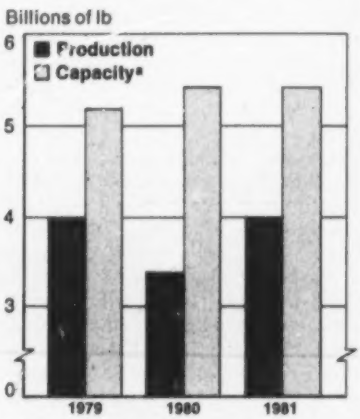
For the moment the word is, leave your polypropylene expansion money in the bank for a much better return. The plants themselves won't measure up for some time.

Polystyrene



- ***Demand slump easing***
- ***Capacity flat***
- ***Price rise possible***

PRODUCTION/CAPACITY



a Nameplate, first quarter.

HOW MADE

Polymerization of styrene using peroxide initiator

MAJOR FABRICATED FORMS

Injection molding 50%, extrusions 30%, foamed beds 10%, one third of end markets in packaging

FOREIGN TRADE

Exports—rising to about 200 million lb in 1980, imports—negligible

PRICES

Contract, after allowances of generally 3 cents, 43 cents a lb for general purpose; discounting lessening but still widespread

COMMERCIAL VALUE

$1.5 billion for total production, 1980

Polystyrene producers are a troubled lot. Their problems this recession year are similar to other thermoplastics producers' but perhaps a bit more severe. Polystyrene already was the poor cousin of thermoplastics in the late 1970's.

Production of polystyrene in 1980 is forecast at about 3.4 billion lb, down 15% from 1979 production. This 1980 estimate may be too high, for during some summer months production was off 30% or more from 1979.

Recovery in 1981 could be fairly strong, equal to the 1980 decline in volume and higher percentage wise from volume at the end of 1980. Good second-half production likely will bring 1981 production to about the 1979 level.

Fortunately, no sizable plant capacity additions are expected for the rest of 1980. As of now, capacity additions next year are expected to be small, possibly less than 5% of first-quarter 1981 capacity of 5.4 billion lb. This capacity figure is unchanged from first-quarter 1980.

Polystyrene capacity, however, can change rapidly. How much capacity is really operable often is open to argument. Currently some capacity is shut down, so a simple estimate, based on total capacity, of 63% for the plant operating rate in 1980 could prove too low.

Some of the shut-down capacity may never be restarted. Still, debottlenecking (making small additions) to capacity is relatively easy, and small new plants can be built in a relatively short time and fed purchased styrene. In other words, polystyrene capacity can adjust fairly fast to changing demand.

Some of the small plants now shut down may be restarted in 1981. However, the operating rate still may climb back over 70%, perhaps near 75%, since capacity may drop a net 100 million lb because of plants permanently shut down.

Even so, a 75% operating rate means continued tough times for polystyrene producers. At this level, producers as a group are probably just marginally profitable. Much depends, of course, on bookkeeping—how much producers get back after temporary voluntary allowances, other discounts, freight costs, and styrene costs.

As of the end of September, downward pressure on polystyrene prices remained heavy but possibly a little less than at the beginning of the month. The tug for sales still is keen. Production cutbacks are beginning to ease the inventory problem, but as the fourth quarter opens, costs of carrying inventories still are high.

As they wrestle with selling competition, polystyrene producers are looking over their shoulders at styrene prices, heavily discounted through temporary voluntary allowances. They also look further up the chain at benzene, ethylene, and basic hydrocarbon prices. For a while, benzene and ethylene prices had been falling, leading to the allowances.

Now, benzene prices are firming, partly because of shifts in demand in oil refiners' gasoline pools toward even higher octane components using aromatics for unleaded gasolines. If prices of these basic chemical materials rise, little doubt exists that polystyrene's present allowances will come off fast as producers try to minimize their absorption of cost increases.

Too fast a rise in polystyrene prices could have the usual undesirable long-term impact—a shift by consumers to other resins, particularly polyolefins, which have nearly as good properties at a lower price. Resin price competition is behind the slightly slower growth in some polystyrene uses in recent years. Final products with not too critical properties such as many consumer semidurables—housewares, toys, or appliance components, for example—could let fabricators shift to other polymers and get something "almost as good" which they think would sell for the same price.

The end result of such price competition is slower overall growth for polystyrene. Combined with growth from new uses of about 5% a year and with a normal bounce-back in large markets now in recession, such losses would put polystyrene production in 1981 about equal to 1979.

After the first postrecession recovery, expansion of polystyrene demand in new and old uses will be slow. This will keep the cloud over polystyrene's profitability, hold down new investment, and raise polystyrene's low plant operating rate.

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Poll suggests public support for chemists

Chemists and chemistry come out quite well in a public opinion survey recently carried out for the American Chemical Society. However, the survey is very limited, involving just four questions. So any conclusions should be drawn with considerable caution.

But the data do indicate that there is wide public agreement that chemists have made significant contributions to the field of medicine. It also is apparent from the results that the public believes quite strongly that chemistry has produced more desirable than undesirable results.

The survey was conducted by Caravan Surveys, division of Opinion Research Corp., of Princeton, N.J. It involved personal interviews with 2052 men and women, 18 years of age and older, living in private households in the continental U.S. The survey sample was designed and the responses weighted so that the final

Responses to four questions break down this way

When you think about science, what fields of science come to mind?

Medicine	40.5%
Chemistry	27.0
Aerospace	16.8
Biology	15.3
Other	45.9
Don't know	13.9
Total	159.4%

Chemists have made significant contributions to the field of medicine.

Strongly agree	67.8%
Tend to agree	24.5
Tend to disagree	1.7
Strongly disagree	0.6
Don't know	5.4

Everything considered, the science of chemistry has produced more desirable than undesirable results.

Strongly agree	46.3%
Tend to agree	35.5
Tend to disagree	7.2
Strongly disagree	2.8
Don't know	8.2

When problems with chemicals are identified, which one group in society do you believe is most to blame?

Manufacturers	32.3%
Government regulations	22.4
Chemists	10.0
Businessmen	7.2
Elected politicians	5.8
Public at large	5.8
Engineers	2.6
Don't know	13.9

results may be projected for the total U.S. population 18 years and older.

The first question asked those polled to identify the fields of science that come to mind when they think about science. Multiple answers were allowed. According to Caravan, this question revealed that the public is hard pressed to name fields of science on an unaided basis.

The most frequently identified science was medicine, named by 40.5% of the weighted sample. Chemistry was second at 27.0%, aerospace third at 16.8%. Chemistry was more frequently identified by the younger generation—by 35% of those between 18 and 29, only 16% of those 60 and older. And chemistry's visibility apparently increases with education. It was named by 43% of college graduates, 17% of those who did not finish high school.

Reaction to the statement "Chemists have made significant contributions to the field of medicine" was almost uniformly positive. Of the total weighted sample 92.3% either strongly agreed or tended to agree. Blue-collar workers and those from low-income families—less than $7000 per year—were a little less positive. However, agreement did not fall below 80% for any subgroup.

With this strong recognition of chemistry's role in medicine, it is not surprising that reaction to the next statement "Everything considered, the science of chemistry has produced more desirable than undesirable results" also was quite positive. Of the total sample, 81.8% agreed with it, 10.0% disagreed, and 8.2% did not know. Again agreement was stronger among the better educated and more affluent.

Results from the fourth and last question—"When problems with chemicals are identified, which one group in society do you believe is most to blame?"—are the most difficult to interpret. Manufacturers come out highest on the list at 32.3% with government regulators second at 22.4%, chemists third at 10.0%, and businessmen fourth at 7.2%.

It is not clear what those who answered this question understood "manufacturer" to mean, and especially how it related to "businessmen" and "chemist." A manufacturer is a combination of management, sales, and other front office personnel, including "businessmen"; technical personnel, including "chemists"; and production workers. It also would be interesting to find out why government regulators rated so high. Is it because the public sees regulations as inhibiting chemical operations? Or is it because regulations are perceived as inadequate? □

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